VOLUME 2 - NO. 2 MAY 1994

The Low Band Monitor

Pressing The Reset Button

The editor has decided to shut off his radio until the CQWPXCW Contest, the last weekend in May. Amateur Radio and Low Band DXing, like everything, get stale if they are pursued for extended periods of time. In North America most amateurs are dedicating their energies to other things. In recent weeks I put a new *Tecumseh* short block into my *Craftsman* lawn tractor and put my old 1972 Canary Yellow *Porsche* Targa back on the road, after three straight years of beautifying the garage. Battling yard work and chain tensioners are the order of the day now, the low bands can wait.

If you are like me you are probably trying to figure out a way to tone up the body during the next few months and then execute your low band antenna improvement plan(s) sometime in late August or early September. The weather in Colorado this time of year is very predictable. You get a thunderstorm every night and if you leave any of your equipment energized you will eventually lose it. This reality, and the fact that we all must take our aerobic opportunities when we can, will put me effectively on the sidelines for the next sixty days.

Where Are We Headed?

The first year of the *Low Band Monitor's* existence went pretty much as expected. I personally grade the first year out with a modest "C" Grade. This isn't the *National Review*, and I am certainly not William F. Buckley Jr., but there were some rather innovative moments that made up for some of the typographical and production faux pas that often occur in a newsletter of this kind. Mea maxima copa!

Some of the topics that will define our focus in the next few months include:

- Those of you that have previously provided Power Spots™ will be sent a supply of post cards under separate cover. Thank you for your support.
- During the North American Summer months we will reduce the Power Spots™ down to one page as before and put more emphasis on antenna and accessary construction type articles.
- The Low Band Propagation Study Data for 1993 will be printed during the late summer so that the statistics and information presented can be an aid for the coming Fall and Winter DX season.
- General Consensus for the coming Low Band Season is to start it on September 1, 1994 and end it on April 1, 1995. The awards and reporting will be maintained basically like this season. The concept of a seven month operating "season" is used simply to promote a more healthy life style among low band DXers during the summer months.
- An "Order of Merit" has been discussed. I have been working with a friend who is a world class skeet shooter and have been impressed with the annual reporting methods used that rate these enthusiasts by calibre or gauge classifications. My reluctance to do this is not based on ethics or honesty concerns, but rather the tendency today for people to not want to bother with micro-management types of reporting. Since the ARRL formally advised that their computer hardware cannot support a 40-80 or 160 Meter Honor Roll, perhaps we should have one. If you wonder how small of a niche Low Band DXing is, just remember that the lonely RTTY enthusiasts now have a DXCC Honor Roll and we didn't get one.

Peter I Island- 160 Meter Logs

You will find a copy of the 3Y0PI 160 Meter logs inside this issue of the *Low Band Monitor*. It looks like many of our subscribers were able to connect with this operation on "Top Band", which represents quite an achievement.

The procurement of these magnificent logs was made possible by the cooperation of Ralph Fedor, K0IR, Tony Deprato, WA4JQS, and Bob Craig, K8RC.

I was introduced to Bob at the Dayton Hamvention™ by Clark, W8TN, at the *Debco Electronics* booth while watching the 60,000 3Y0PI contacts scroll on one of their computers.

Bob led a team of twelve individuals from the Cincinnati, Ohio area (listed on the following pages) who had to convert the hand written logs of the 3Y0PI team into a computer format for labeling.

Can you imagine the effort expended by this group to decipher the handwriting of the different operators and then keypunch the 60,000 contacts? This is truly one of the most impressive "behind the scenes" projects in the history of our hobby.

The labels were produced for use by Jerry Branson's, AA6BB's QSL team and as most of you know, the folks from Oregon had the cards in the mail by the middle of May, less than ninety days after the last contact was made.

I have made some breakdowns of the 160 meter log data to help you review the 369 contacts more easily.

The logs are sorted in callsign order. No attempt was made to identify all the U.S. calls that had locations outside of their district's prefix. Thus AA6TT is identified as a W6, KB0G is identified as a W0, and WB2ULI is a W2, even though we know that they are Colorado(W0), Georgia(W4), and Texas(W5) stations respectively.

I am sure there are other callsigns from this group that will change the final QSO distribution by U.S. District by a few contacts; however one thing stands out that is very surprising.

What happened to the 3rd (22-160 Meter QSO's), the 5th (20-160 Meter QSO's) and the 8th (19-160 Meter QSO's) Districts? I would have expected much higher totals from each of these Districts when you consider that the 3Y0PI operation offered eight evening operating sessions on "top band" over the duration of the DXpedition.

If you listened to Ralph, K0IR's talk at the Dayton Hamvention™ DX Dinner you know that a maximum effort was put forth to deliver a 160 meter signal to the faithful. Three different 160 meter antenna systems were used on this band as blizzard conditions played havoc with everything they tried.

Think about this; these Districts averaged 2.5 contacts per each evening 3Y0PI 160 meter operating session. Look at your map and try to figure out how the 5th District (wet and southern) could only make 20 contacts in eight different operating opportunities.

Propagation to the 7th District, where only 6 contacts were managed did not surprise me. Can any of our European subscribers advise us about the meager 26 contacts with Europe? There are some very well known calls from Europe that are not in the 160 meter log! Perhaps 3Y2GV worked the band out in 1987?

If these logs don't confirm the cruel vagarities and nonparametric nature of the 160 meter band, nothing will. If you followed the Boulder "A" and "K" Indices during the operation they simply offered no clues.

The only interesting clue that stands out for February 12 (the day 120 of the 160 Meter contacts were made) is provided in Robert Schmeider, KK6EK's book, *3Y0PI Peter I Island Antarctica*, is that there was a significant temperature rise on that day.

This is interesting, but it certainly doesn't explain why almost one third of the contacts were made on this day.

For those of you that are in the 160 Meter log, congratulations! You have worked one of the best contacts of your ham career.

Thanks again to Bob Craig, K8RC, of *Debco Electronics*, the maker of *DX Desktop*™ Software, for allowing us all to peruse these logs.

Lance Johnson - Editor

The COMTEK Systems ACB-4

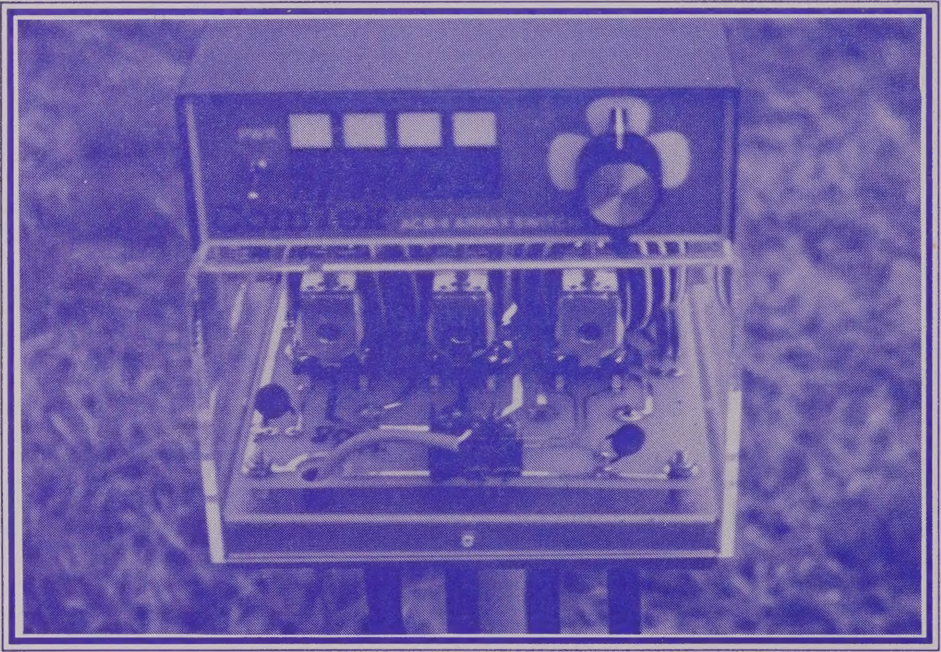
A Look At A Phased Vertical Array Control - With KF4HK

Editors note: Great things are happening to some of the Low Band products of the 1980's. We review the new Comtek Systems ACB-4 Array Switch in detail. This product shows great promise for the aspiring Low Band DXer.

When antennas are discussed, topics like forward gain, front-to-back ratio and beam width are usually mentioned. Most of us have experienced what these parameters imply on 10 thru 40 meters.

Experiencing gain, front-to-back and beam width on a band like 80 meters is a different story. This is an experience that actually transcends the numbers. The ability to hear signals and break huge pileups on this band can actually change the attitude you have about yourself. A phased vertical array can do great things for ones self confidence.

The next time you sweat out your 33 or 339 report on 80 meters just remember that there were some phased vertical array owners monitoring your "contact" that had rock solid copy during the whole ordeal and they know that you didn't get in the log.



The ComTek ACB-4 Control Box is shown with the unit's remote phasing box. The enclosure has been removed to expose the PC board, toroids and relays. The control cable and phasing lines are also shown.

Phased vertical array owners quite simply are at the top of the Low Band DX food chain.

I am sure you have thought about owning a rotatable yagi to improve your status on the 80 meter band, but have you thought this through. The cost of the yagi, rotor and heavy duty tower will be three to five times the cost of a vertical array.

Many enthusiasts have built their arrays with wire using only a single tower as a support. You will also find out that a vertical array will survive a windstorm better than a yagi.

Lets assume that money is not a factor. Maintenance on a yagi is done at life threatening heights. Maintenance on a phased vertical array is done on the ground. If you like to socialize with crane operators I would suggest that you buy a yagi.

If you contest with an 80 meter yagi you will also find that the full minute to rotate the beam is not fun at all. The vertical array owner can switch directions almost instantly.

Historically, the phased array has scared many amateurs away because of the complexity of designing and building an appropriate switching network.

Sure you can build one yourself and save money. A few relays, some toroids and a few connectors. Will it work? Will you find the time? Will you ever complete it?

These concerns are warranted because most amateurs do not possess the equipment or the time to execute a good working system of this type.

Operation Theory - It is commonly known that various types of elements can be combined to produce an array that determines directivity, gain and front to back ratio.

In the case of the two element vertical array, by feeding both antennas the same current but orienting one antenna 90 degrees out of phase a directivity will result in the direction along the line drawn between the two vertical elements, with radiation being in the direction from the -90 degree element to the 0 degree element.

In the case of a 4 element array, all elements are fed at the same current level; however, direction wise, the rear element is fed at 0 degrees phasing, the two side elements at -90 degrees and the lead element is fed at -180 degrees. Maintaining the same currents at each element as well as reconciling the effects of mutual coupling and precise phasing are the key issues in any phased vertical system.

There are several theories on phasing. The primary concern in phasing is a proper method for dealing with mutual coupling. Feed systems in the past have utilized various forms of power dividers, pi-networks, or T-networks where typically it is found that desired phasing multiples of 90 degrees cannot be obtained within acceptable tolerances. Some people in the field feel that the W1FC Collins Hybrid Design is the most efficient method of phasing.

The W1FC Collins Hybrid - In the early 1980's a company called *ColAtchco* offered a phasing system that was based on the W1FC Collins design. The Fred Collins, W1FC, Hybrid Design consists of quarter wave spacing, quarter wave elements and quarter wave radials simply laying on the ground.

The phasing and coupling resolution is obtained through W1FC's design of a hybrid transformer which provides a phase difference of 90 degrees. In the case of a 4 element system, this hybrid is combined with a 180 degree coaxial line phasing, which when switched provides the appropriate combinations of directivity. This system also provides a "dumping" of any reflected power which may be produced if impedances vary at the powered ports.

Recent Developments - *Comtek Systems*, of Charlotte, North Carolina now owns the drawings and tooling of the original *ColAtchco* product that was called the instant array and the original designs from the 1980's have undergone some dramatic improvements due to the help of some modern technology and hard work by the companies new owner.

The prototype ACB-4 Hybrid Transformer was analyzed on a *Hewlett Packard* Network Analyser by an independent laboratory that allowed *Comtek Systems* to add even better front to back performance to their array than before. Additional improvements include a one amp transformer and full wave bridge rectifier for the beefed up power supply.

Jim Miller, KF4HK, the owner of *Comtek Systems,* advises that the switching units are sold for individual bands and that the 15, 20, 40, 80 and 160 meter band units sell for $319.00 plus $12.00 shipping.

A special model called the ACB-4/80-40 is available that provides dual band coverage on the 40 and 80 meter bands.

Jim is not a newcomer to the low bands, as he was first licensed in 1971 as WA3SOD, and has operated as KZ5JM (71-79) and HP1XRK (79 -82). He has even built a 160 meter phased vertical system using this Collins Hybrid and has ten years of practical experience with the concept.

Jim notes that no coax cables are hanging out at the switch box or laying on the ground with this design. The exterior switchbox of the ACB-4 contains all of the switching, phasing and power dividing apparatus accomplished using hybrid toroid tranformers.

Phased Array Antennas - The essence of the array is the ACB-4 switch matrix. The radiators themselves are vitally important. The following types of antennas have all been used successfully with the ACB-4:

1. Ground mounted 1/4 wave verticals
2. Elevated 1/4 wave verticals
3. Center fed 1/2 wave dipoles
4. Folded unipoles or grounded verticals

The ACB-4 contains two hybrids and the necessary switching matrix to provide correct phasing to each of the four elements 0° - 90° - 180° - -90°. Two element arrays can also use the ACB-4 by simply using the 0° and 90° ports. Power division is accomplished with the ACB-4 so all ports get an equal power split. Due to mutual coupling within the array, each element will present a different impedance, one that is different than a single element.

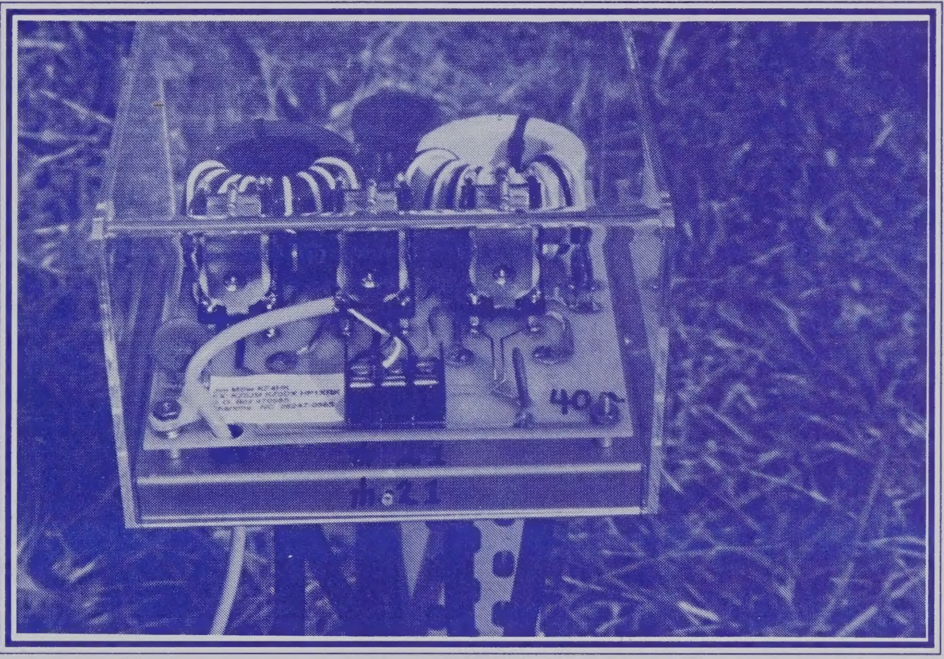
If all of the elements are not the same the system will not be symmetrical and an imbalance will result. Be careful to make each radiator as much alike as possible. The physical layout of the array is also important.

Elements should be symmetrical in placement. The 4-square vertical array is directional across its diagonals. So, when laying out your array make certain you know the difference between true north and magnetic north.

Remember, you will be beaming across the diagonals. Spacing along the sides of the square should be determined by 246/f (Mhz.) for best pattern results. This means that the diagonal distance will be 1.41 x 246/f (Mhz.). Other spacings close to this value will work, but the characteristics of the main lobe will change somewhat. Time spent in laying out a symmetrical installation will pay solid dividends. The system is forgiving, but the best front-to-back ratio is obtained when symmetry is maintained and with each element resonant on the same frequency.

System Performance - The ACB-4 uses a quadrature hybrid in toroid form to obtain a 90° phase shift. The phase shift is extremely constant over a wide frequency range. This device is a four port hybrid and must be terminated with a 50 ohm dummy load. This termination is vital. When the array is working well, with all elements resonant, there is typically less than 5 percent power dissipated by this load.

However, when an element is open, shorted or not resonant at the same frequency as the other elements, power will be dissipated by this load. A test of the system is to measure the power between the ACB-4 and this dummy load. The lower the power reading on the dummy load, the better the system is performing. The 50 ohm coax between the ACB-4 and the dummy load can be any convenient length.



This view of the remote phasing box provides a better view of the W1FC Designed Hybrid Transformer used in the ComTek Systems ACB-4.

Front-to-back is affected by an unequal balance between elements. If you want good front-to-back, pay attention to the details of making each element the same and symmetrical. On the 4-square array you will notice the best front-to-back on low angle signals. Signals arriving at high angles see all the elements of the array at the same time and no phase shift is possible.

Tuning The Radiators - The following method is used for any type of array element.

1. Put up one radiator and install the ground system.
2. Connect a 50 ohm feedline to the radiator.
3. Tune the radiator to the lowest VSWR at the desired frequency (.95 x desired freq.) For example for 3.800 Mhz. tune for

3.610 Mhz. (3.800 x .95 = 3.610 Mhz.)

4. Disconnect the 50 ohm feedline.

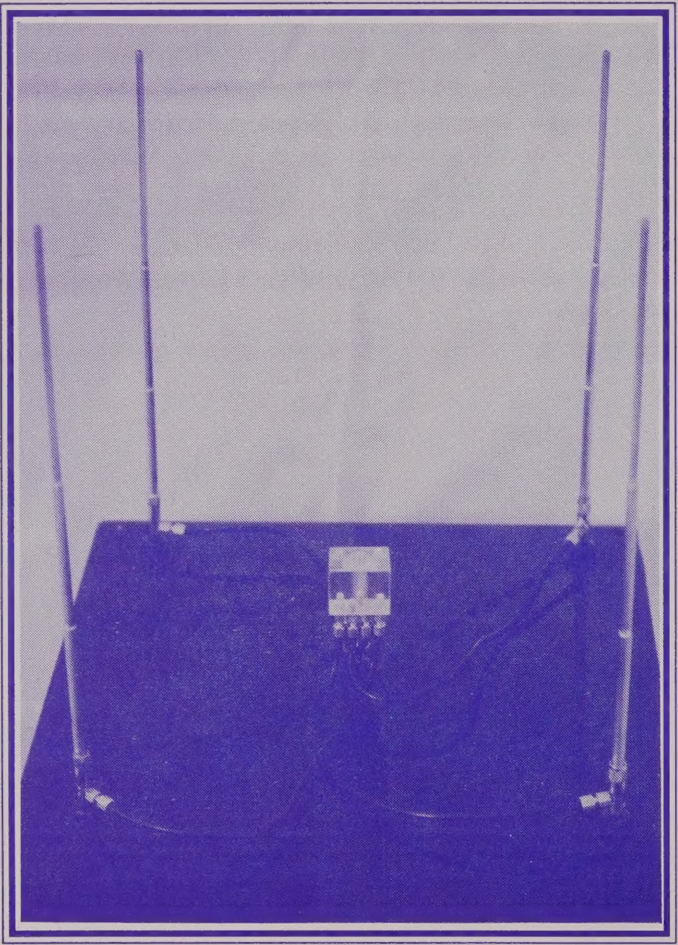
5. Make the remaining radiators physically identical to the first.

6. Connect all radiators with 1/4 wave 75 ohm foam coax to their respective ports on the ACB-4.

7. Connect a 50 ohm dummy load to the ACB-4 port using a convenient length of coax. Note: The *Ten Tec* 300 watt dummy load has worked well for this application.

8. Connect the 50 ohm feedline and ACB-4 control cables.

9. Check the VSWR across the band. Plot the power going into the dummy load across the whole band. Adjust all element length the same amount if necessary to minimize the power going into the dummy load.



Trade Show Model of the ComTek Systems ACB-4.
Affordable Free Standing Phased Vertical Array.

Practical Considerations - Install the coax cables so that position #2 on the units control box is your most favored position.

Position #2 does not supply power to any of the units relays inside the units switchbox and is the default direction. When the power is off on your ACB-4 you will be pointing in #2 direction.

Velocity Factor - Most types of RG-11 foam coax have a velocity factor of .78. The formula for a specific frequency is: 246/f (Mhz.) x .78 = length in feet.

For example this works out to 50.5 feet at 3.800 Mhz. or 50 feet - 6 inches of RG-11. If you choose to have 3.5 to 3.8 Mhz. coverage, cut your RG-11 for a frequency of 3.650 Mhz. With a velocity factor of .78, this will come out to be 52 feet, 6 inches. Your SWR should be 2:1 from 3.5 - 3.8 Mhz.

Remember, if you don't use foam coax when making these phasing lines and use poly coax instead with a .66 velocity factor, the phasing line won't be long enough to reach the array element!

Ground Radials - A minimum of 20 ground radials per array element is required. Commercial arrays typically use 120 ground radials for each array element. An elevated radial and elevated vertical element system (10 to 15 feet) will be more difficult to prune, but recent studies would indicate that only four elevated radials per element will yield good results.

Conclusion - Is this the year for making your move up the Low Band DX food chain? The Comtek Systems ACB-4 is certainly a viable step forward for those DXers that don't have the time to build their own phasing apparatus. The ACB-4 is an improved design that offers almost "plug and play" operation that eliminates much of the complexity in building operating a phased vertical array.

On 80 meters with a good ground system you can expect around 5.5 to 6.0 db gain, and 25 db of front-to-back with a 46° beam width. One of our local operators in Denver, Colorado has one of the ACB-4 units on the 80 meter band with a 4 square using four elevated radials (10 feet) on each element. "He now participates in a hobby of which I am unfamiliar." The phased array is simply a different operating realm.

For more information and ordering instructions contact: *Comtek Systems*, P.O. Box 470565, Charlotte, NC 28247. Their telephone number is (704) 542-4808. Their FAX is (704) 542-9652.

THE LOW BAND MONITOR
Your Guide To the Low Bands

• Antennas • Product Reviews
• DXpeditions • Power Spots™
• Operator Profiles • Awards • Propagation
• Book Reviews • Monthly Circulation

U.S. - $24.00/yr VE - $28.00/yr DX - $36.00/yr

VISA and MasterCard Accepted

Lance Johnson Digital Graphics
P.O. Box 1047
Elizabeth, CO 80107

SPOT OF THE MONTH CLUB WINNERS FOR MAY

WIN AN EXTRA MONTH'S SUBSCRIPTION

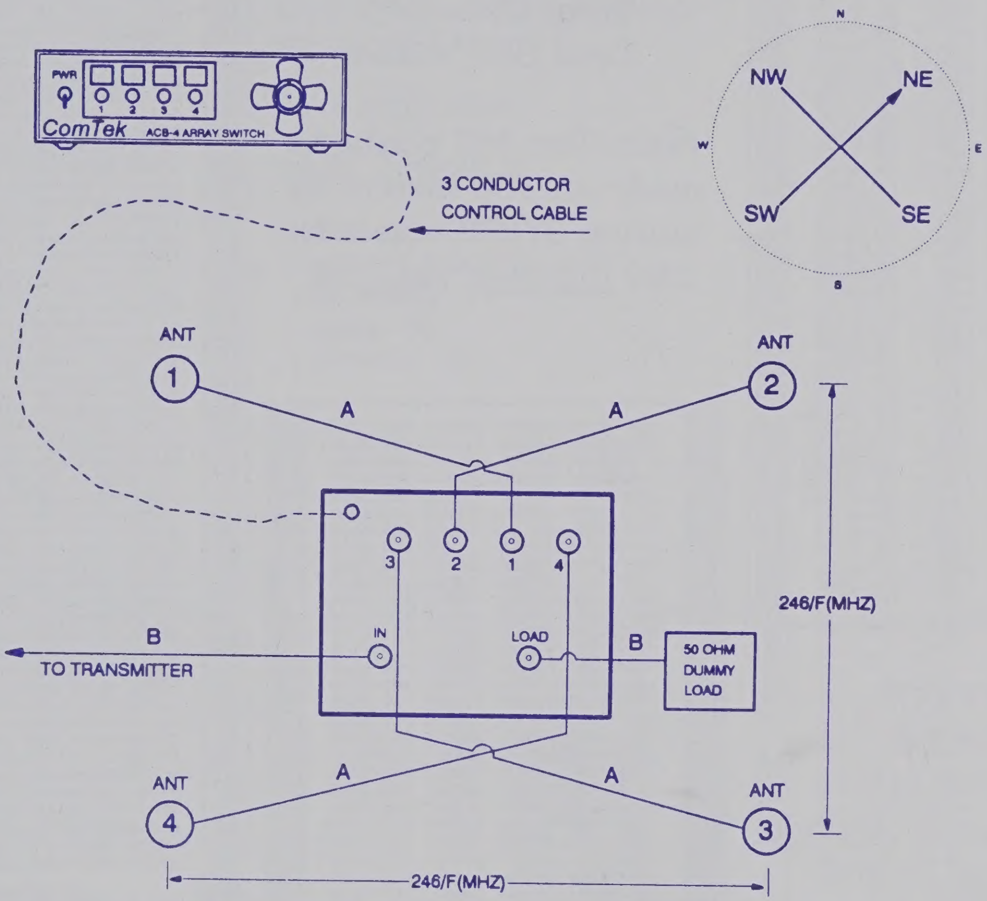
VE7BS
UA0IAK - 1.826 - 1220Z - 7 MAY
AB6ZV
XX9GD - 3.798 - 1317Z - 12 MAY
W8TN
C21/ZL1AMO - 7.006 - 1033Z - 4 MAY

SEND YOUR SPOTS TO:

LOW BAND MONITOR
P.O. Box 1047
Elizabeth, CO 80107
(303) 646-4630

Details of the ComTek ACB-4 Array Switch

ComTek ACB-4 ARRAY SWITCH



NOTE:

A= 1/4 WAVE OF 75 OHM AT .78 VEL

B= ANY LENGTH OF 50 OHM COAX

CONTROL BOX POSITION	BEAM DIRECTION	RELATIVE PHASING			
		#1	#2	#3	#4
1	NW	-180	-90	0	-90
2 *	NE	-90	-180	-90	0
3	SE	0	-90	-180	-90
4	SW	-90	0	-90	-180

* DEFAULT RELAY SETTING (NO POWER ON CONTROL BOX)

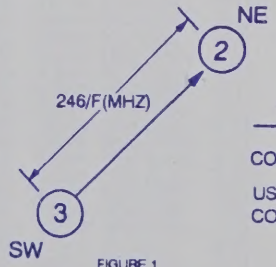


FIGURE 1

TWO ELEMENT SETUP

CONTROL BOX: #2=NE, #3=SW

USE 1/4 WAVE LENGTH OF 50 OHM COAX TO ACB-4 SWITCHBOX

The 3Y0PI 160 Meter Log

Compliments of K8RC and the 3Y0PI Computer Logging Team

```
02/15/94 0640Z  160M   SSB 4K1F
02/15/94 0640Z  160M   SSB AA4MM
02/09/94 0645Z  160M   SSB AA4NU
02/12/94 0816Z  160M   SSB AA4NU
02/15/94 0640Z  160M   SSB AA4US
02/15/94 0640Z  160M   SSB AA4V
02/04/94 0518Z  160M    CW AA5BL
02/12/94 0715Z  160M   SSB AA5DX
02/10/94 0636Z  160M   SSB AA6TT
02/15/94 0640Z  160M   SSB AA6TT
02/13/94 0450Z  160M    CW AA6TT
02/13/94 0544Z  160M    CW AA6TT
02/13/94 0556Z  160M    CW AA6TT
02/04/94 0356Z  160M   SSB AB5MQ
02/12/94 0816Z  160M   SSB AC1B
02/14/94 0553Z  160M   SSB AC4HJ
02/04/94 0519Z  160M    CW AD1G
02/12/94 0750Z  160M   SSB AD4HC
02/13/94 0425Z  160M    CW AD4RU
02/13/94 0450Z  160M    CW AD6C
02/13/94 0531Z  160M    CW AF0Y
02/13/94 0627Z  160M    CW AF9Y
02/04/94 0356Z  160M   SSB DF3CB
02/13/94 0450Z  160M    CW DJ6RX
02/13/94 0425Z  160M    CW DK7SU
02/13/94 0425Z  160M    CW G3PQA
02/13/94 0425Z  160M    CW G3RPB
02/04/94 0356Z  160M   SSB I2AOX
02/13/94 0450Z  160M    CW I3JSS
02/13/94 0450Z  160M    CW I4EAT
02/13/94 0450Z  160M    CW I4IKW
02/04/94 0356Z  160M   SSB IK2BLA
02/04/94 0356Z  160M   SSB IK2BLS
02/04/94 0356Z  160M   SSB IK2GNW
02/04/94 0356Z  160M   SSB IK2SGC
02/13/94 0425Z  160M    CW IK3PRK
02/13/94 0450Z  160M    CW IK4DCT
02/13/94 0450Z  160M    CW IK4GME
02/13/94 0450Z  160M    CW IV3PRK
02/12/94 0750Z  160M   SSB K0CS
02/12/94 0750Z  160M   SSB K0EPE
02/12/94 0715Z  160M   SSB K0FF
02/12/94 0715Z  160M   SSB K0HA
02/15/94 0640Z  160M   SSB K0HA
```

SECTION 1 OF 7

3Y0PI LOG DETAILS

The 60,000 QSO's made by the 3Y0PI ops were hand logged. A team from the Cincinnati, Ohio area, using software developed by K8RC, spent many hours entering the data into a database so the QSL labels could be produced. The labels were immediately sent to the AA6BB team and the 3Y0PI QSL cards were being sent in mid-May!

160 METER QSO'S SSB VS. CW

Total QSO's = 369
Total CW = 105
Total SSB = 264

Note: The 369 contacts made on 160 meters by station 3Y0PI was with 299 different stations.

```
02/15/94 0640Z  160M   SSB K0IFL
02/12/94 0641Z  160M   SSB K0JGH
02/12/94 0641Z  160M   SSB K0KE
02/15/94 0640Z  160M   SSB K0KX
02/13/94 0425Z  160M    CW K1BNQ
02/13/94 0410Z  160M    CW K1DG
02/12/94 0830Z  160M   SSB K1FWS
02/10/94 0703Z  160M   SSB K1JO
02/12/94 0816Z  160M   SSB K1JO
02/13/94 0425Z  160M    CW K1KI
02/10/94 0703Z  160M   SSB K1MEM
02/12/94 0715Z  160M   SSB K1MEM
02/12/94 0750Z  160M   SSB K1MM
02/13/94 0410Z  160M    CW K1NA
02/13/94 0410Z  160M    CW K1ST
02/10/94 0636Z  160M   SSB K1ZM
02/13/94 0410Z  160M    CW K1ZM
02/13/94 0410Z  160M    CW K1ZZ
02/10/94 0636Z  160M   SSB K2BU
02/13/94 0450Z  160M    CW K2BU
02/12/94 0830Z  160M   SSB K2CL
02/14/94 0553Z  160M   SSB K2CL
02/11/94 0745Z  160M    CW K2CL
02/10/94 0636Z  160M   SSB K2DOX
02/11/94 0643Z  160M    CW K2DOX
02/13/94 0450Z  160M    CW K2DOX
02/14/94 0553Z  160M   SSB K2EK
02/11/94 0643Z  160M    CW K2KE
02/12/94 0816Z  160M   SSB K2KIR
02/11/94 0643Z  160M    CW K2KIR
02/13/94 0410Z  160M    CW K2KIR
02/12/94 0715Z  160M   SSB K2VV
02/10/94 0703Z  160M   SSB K2WK
02/12/94 0816Z  160M   SSB K3ANS
02/14/94 0553Z  160M   SSB K3II
02/13/94 0450Z  160M    CW K3NW
02/14/94 0553Z  160M   SSB K3UA
02/15/94 0640Z  160M   SSB K4CEF
02/13/94 0612Z  160M    CW K4DY
02/15/94 0640Z  160M   SSB K4IUV
02/12/94 0750Z  160M   SSB K4LTA
02/12/94 2341Z  160M   SSB K4LVD
02/13/94 0425Z  160M    CW K4LY
02/04/94 0356Z  160M   SSB K4MGP
02/09/94 0705Z  160M   SSB K4ODL
02/12/94 0816Z  160M   SSB K4ODL
02/12/94 0830Z  160M   SSB K4PI
02/04/94 0513Z  160M    CW K4PI
02/12/94 0830Z  160M   SSB K4TEA
02/12/94 0830Z  160M   SSB K4UEE
02/12/94 0830Z  160M   SSB K5AQ
02/04/94 0526Z  160M    CW K5KLA
02/12/94 0641Z  160M   SSB K5KZ
02/04/94 0521Z  160M    CW K5MR
02/13/94 0410Z  160M    CW K5NA
02/12/94 0641Z  160M   SSB K5UR
02/04/94 0514Z  160M    CW K5UR
02/04/94 0517Z  160M    CW K5XI
02/04/94 0528Z  160M    CW K5XI
02/09/94 0649Z  160M   SSB K6AJJ
```

SECTION 2 OF 7

```
02/12/94 0715Z  160M   SSB K6GNX
02/11/94 0809Z  160M    CW K6JPZ
02/09/94 0608Z  160M   SSB K6NA
02/11/94 0740Z  160M    CW K6RK
02/09/94 0617Z  160M   SSB K6TQ
02/10/94 0703Z  160M   SSB K6XT
02/12/94 0715Z  160M   SSB K7IDX
02/15/94 0640Z  160M   SSB K7OXB
02/12/94 0830Z  160M   SSB K8CFU
02/12/94 0830Z  160M   SSB K8CX
02/12/94 0715Z  160M   SSB K8GG
02/12/94 0715Z  160M   SSB K8JJC
02/12/94 0715Z  160M   SSB K8JP
02/11/94 0735Z  160M    CW K8MFO
02/12/94 0641Z  160M   SSB K9AJ
02/12/94 0715Z  160M   SSB K9FD
02/14/94 0553Z  160M   SSB K9RJ
02/12/94 0641Z  160M   SSB K9UWA
02/11/94 0643Z  160M    CW KA1PE
02/12/94 0830Z  160M   SSB KA1QC
02/13/94 0618Z  160M    CW KA9A
02/15/94 0640Z  160M   SSB KB0G
02/13/94 0410Z  160M    CW KB1H
02/12/94 0816Z  160M   SSB KB6I
02/04/94 0356Z  160M   SSB KB6V
02/04/94 0356Z  160M   SSB KD6EU
02/12/94 0641Z  160M   SSB KD9SV
02/15/94 0640Z  160M   SSB KE8CQ
02/12/94 0641Z  160M   SSB KF0H
02/12/94 0816Z  160M   SSB KF4IX
02/12/94 0830Z  160M   SSB KF5KE
02/12/94 0816Z  160M   SSB KG6I
02/15/94 0640Z  160M   SSB KH6CC
02/12/94 0816Z  160M   SSB KH8AC/W1
02/10/94 0703Z  160M   SSB KH8DC
02/04/94 0356Z  160M   SSB KI2G
02/12/94 0750Z  160M   SSB KI4XO
02/12/94 0830Z  160M   SSB KK4NP
02/04/94 0356Z  160M   SSB KK6HI
02/12/94 0715Z  160M   SSB KM1H
02/12/94 0715Z  160M   SSB KM5L
02/04/94 0356Z  160M   SSB KM6CW
02/04/94 0356Z  160M   SSB KM6K
02/15/94 0640Z  160M   SSB KN2T
02/10/94 0703Z  160M   SSB KN4UI
02/09/94 0615Z  160M   SSB KN4VE
02/15/94 0640Z  160M   SSB KN4VE
02/15/94 0640Z  160M   SSB KN6M/5
02/15/94 0536Z  160M    CW KN6M/5
02/12/94 0715Z  160M   SSB KN8Z
02/09/94 0715Z  160M   SSB KO4WE
02/12/94 0750Z  160M   SSB KO4WE
02/12/94 0830Z  160M   SSB KR4KX
02/13/94 0612Z  160M    CW KR9U
02/15/94 0536Z  160M    CW KS1L
02/15/94 0640Z  160M   SSB KS9W
02/15/94 0640Z  160M   SSB KS9W
02/13/94 0410Z  160M    CW KU2Q
02/11/94 0720Z  160M    CW KV0Q
02/11/94 0759Z  160M    CW KV0Q
```

SECTION 3 OF 7

THE 3Y0PI LOGGING TEAM

Bob Craig - K8RC
Tom Case - K8CLA
Debi Case - N8BVI
Bob Otto - N8NGA
Ken Scheper - WA8JOC
Jay Slough - K4ZLE
Jim Cox - N8JLS
Roger Mayer - WD8SDL
Steve Corwin
Bert Rathcamp
Gary Burgess
Michael Krebs

NOTICE: This document is COPYRIGHT 1994 BY Robert O. Craig, K8RC

The 3Y0PI 160 Meter Log

```
02/12/94 0750Z  160M   SSB KX4R
02/12/94 0816Z  160M   SSB KY0A
02/11/94 0712Z  160M    CW KY0A
02/13/94 0425Z  160M    CW KY2J
02/10/94 0636Z  160M   SSB KZ3H
02/04/94 0356Z  160M   SSB LU1CFR
02/12/94 0715Z  160M   SSB LU1FA
02/10/94 0636Z  160M   SSB LU2DVI
02/12/94 0641Z  160M   SSB LU2JCW
02/10/94 0703Z  160M   SSB LU2QC
02/10/94 0703Z  160M   SSB LU5FCI
02/04/94 0509Z  160M    CW LU7XP
02/11/94 0844Z  160M    CW LU7XP
02/10/94 0703Z  160M   SSB LU9FHN
02/10/94 0636Z  160M   SSB N0XA
02/04/94 0509Z  160M    CW N0XA
02/12/94 0750Z  160M   SSB N1TZ
02/14/94 0553Z  160M   SSB N2LT
02/11/94 0730Z  160M    CW N2LT
02/10/94 0703Z  160M   SSB N2MM
02/12/94 0641Z  160M   SSB N2NU
02/14/94 0553Z  160M   SSB N2NU
02/12/94 2341Z  160M   SSB N2ORM
02/12/94 0830Z  160M   SSB N3GOV
02/12/94 2341Z  160M   SSB N3JPS
02/12/94 0816Z  160M   SSB N3KK
02/13/94 0425Z  160M    CW N4CC
02/13/94 0450Z  160M    CW N4CFL
02/14/94 0553Z  160M   SSB N4JJ
02/10/94 0636Z  160M   SSB N4KG
02/04/94 0527Z  160M    CW N4KG
02/15/94 0640Z  160M   SSB N4RJ
02/10/94 0636Z  160M   SSB N4VZ
02/15/94 0640Z  160M   SSB N4VZ
02/14/94 0553Z  160M   SSB N4WW
02/12/94 2341Z  160M   SSB N4XLF
02/12/94 0750Z  160M   SSB N4XM
02/04/94 0535Z  160M    CW N6AR
02/04/94 0522Z  160M    CW N6DX
02/12/94 0816Z  160M   SSB N6FLV
02/12/94 0830Z  160M   SSB N6JV
02/09/94 0612Z  160M   SSB N6ND
02/04/94 0356Z  160M   SSB N6PYN
02/12/94 0816Z  160M   SSB N6QP
02/13/94 0544Z  160M    CW N6RVZ
02/12/94 0715Z  160M   SSB N6VI/KH6
02/12/94 0715Z  160M   SSB N8ATR
02/13/94 0450Z  160M    CW N8CC
02/04/94 0525Z  160M    CW N8SR
02/12/94 0750Z  160M   SSB N9QX
02/10/94 0636Z  160M   SSB NA0Y
02/10/94 0703Z  160M   SSB NA0Y
02/12/94 0641Z  160M   SSB NA0Y
02/12/94 0816Z  160M   SSB NC0P
02/12/94 0715Z  160M   SSB N10F
02/12/94 0750Z  160M   SSB NI6T
02/04/94 0511Z  160M    CW NX0I
02/12/94 0816Z  160M   SSB NY7T
02/04/94 0356Z  160M   SSB NY9T
02/13/94 0425Z  160M    CW OH2BCI
```

SECTION 4 OF 7

160 METER QSO'S BY DAY

DATE	QSO's
Feb 04	39
Feb 05	00
Feb 06	00
Feb 07	00
Feb 08	00
Feb 09	12
Feb 10	47
Feb 11	23
Feb 12	120
Feb 13	61
Feb 14	23
Feb 15	44
TOTAL	369

160 METER QSO DISTRIBUTION

- **NORTH AMERICA** - 327

W1-31 W2-50 W3-22 W4-59
W5-20 W6-40 W7-06 W8-19
W9-22 W0-40

U.S.A. TOTAL=309

VE-08 OTHER-10

- **EUROPE** - 26
- **SOUTH AMERICA** - 15
- **OCEANIA** - 01
- **ASIA** - 00
- **AFRICA** - 00

```
02/13/94 0450Z  160M    CW OH2VY
02/04/94 0356Z  160M   SSB OH5DL
02/13/94 0425Z  160M    CW OM3CQR
02/13/94 0450Z  160M    CW OM3CSA
02/13/94 0450Z  160M    CW OM3YL
02/13/94 0450Z  160M    CW OM3YX
02/04/94 0532Z  160M    CW ON4UN
02/13/94 0531Z  160M    CW ON4UN
02/12/94 0641Z  160M   SSB PP5JR
02/10/94 0636Z  160M   SSB PT9ZZ
02/10/94 0636Z  160M   SSB PY2BW
02/10/94 0636Z  160M   SSB PY2BW
02/10/94 0636Z  160M   SSB PY5CC
02/09/94 0617Z  160M   SSB VE1ZZ
02/10/94 0636Z  160M   SSB VE1ZZ
02/11/94 0539Z  160M    CW VE1ZZ
02/12/94 0750Z  160M   SSB VE7CT
02/12/94 0816Z  160M   SSB VE7ID
02/12/94 0750Z  160M   SSB VE7SV
02/10/94 0703Z  160M   SSB VE9AA
02/11/94 0538Z  160M    CW VO1NA
02/04/94 0507Z  160M    CW W0CD
02/12/94 0641Z  160M   SSB W0CM
02/15/94 0640Z  160M   SSB W0CM
02/15/94 0640Z  160M   SSB W0CP
02/15/94 0640Z  160M   SSB W0DH
02/15/94 0640Z  160M   SSB W0DRL
02/15/94 0536Z  160M    CW W0DRL
02/12/94 0641Z  160M   SSB W0IFH
02/14/94 0553Z  160M   SSB W0LYI
02/12/94 0715Z  160M   SSB W0RI
02/15/94 0640Z  160M   SSB W0WP
02/15/94 0640Z  160M   SSB W0ZV
02/10/94 0703Z  160M   SSB W1JZ
02/12/94 0715Z  160M   SSB W1JZ
02/14/94 0553Z  160M   SSB W1NG
02/10/94 0703Z  160M   SSB W1OO
02/12/94 0641Z  160M   SSB W1OO
02/12/94 0816Z  160M   SSB W1WAI
02/10/94 0636Z  160M   SSB W1ZE
02/12/94 0715Z  160M   SSB W1ZK
02/14/94 0553Z  160M   SSB W2FCR
02/14/94 0553Z  160M   SSB W2JB
02/14/94 0553Z  160M   SSB W2MEV
02/12/94 0750Z  160M   SSB W2MPK
02/12/94 0830Z  160M   SSB W2NQ/7
02/10/94 0703Z  160M   SSB W2OKM
02/11/94 0748Z  160M    CW W2OKM
02/11/94 0821Z  160M    CW W2OKM
02/14/94 0553Z  160M   SSB W2RQ
02/14/94 0553Z  160M   SSB W2SM
02/14/94 0553Z  160M   SSB W2TQC
02/12/94 0715Z  160M   SSB W2V0
02/10/94 0636Z  160M   SSB W2VO
02/11/94 0724Z  160M    CW W2VO
02/13/94 0425Z  160M    CW W2VO
02/10/94 0703Z  160M   SSB W3BGN
02/13/94 0531Z  160M    CW W3BGN
02/15/94 0640Z  160M   SSB W3RCQ
02/15/94 0640Z  160M   SSB W3RCQ
```

SECTION 5 OF 7

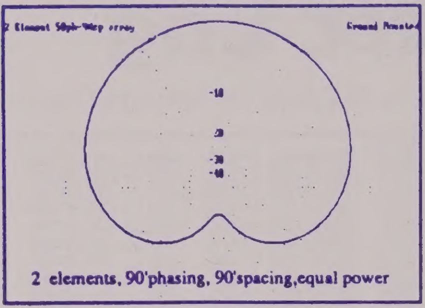
```
02/15/94 0640Z  160M   SSB W3RCQ
02/10/94 0703Z  160M   SSB W3UM
02/13/94 0556Z  160M    CW W4AI
02/15/94 0640Z  160M   SSB W4DKK
02/10/94 0636Z  160M   SSB W4DR
02/13/94 0425Z  160M    CW W4DR
02/13/94 0410Z  160M    CW W4FX
02/04/94 0356Z  160M   SSB W4GIW
02/15/94 0640Z  160M   SSB W4MEV
02/10/94 0636Z  160M   SSB W4MYA
02/12/94 0641Z  160M   SSB W4NL
02/12/94 0641Z  160M   SSB W4QCU
02/09/94 0658Z  160M   SSB W4VKK
02/15/94 0640Z  160M   SSB W4VKK
02/10/94 0636Z  160M   SSB W4YV
02/12/94 0641Z  160M   SSB W5EU
02/12/94 0641Z  160M   SSB W5FIX
02/13/94 0450Z  160M    CW W5FIX
02/15/94 0640Z  160M   SSB W5TO
02/12/94 0816Z  160M   SSB W6DAO
02/11/94 0804Z  160M    CW W6DAO
02/12/94 0830Z  160M   SSB W6FSJ
02/12/94 0750Z  160M   SSB W6GO
02/12/94 0750Z  160M   SSB W6JRY
02/10/94 0703Z  160M   SSB W6MDH
02/12/94 0816Z  160M   SSB W6MDH
02/10/94 0703Z  160M   SSB W6MKB
02/12/94 0816Z  160M   SSB W6MKB
02/12/94 0750Z  160M   SSB W6OSP
02/04/94 0356Z  160M   SSB W6PUW
02/09/94 0647Z  160M   SSB W6QHS
02/12/94 0715Z  160M   SSB W7LR
02/12/94 0641Z  160M   SSB W7XR
02/12/94 0816Z  160M   SSB W7ZFX
02/12/94 0750Z  160M   SSB W8JI
02/10/94 0636Z  160M   SSB W8LRL
02/12/94 0641Z  160M   SSB W8UVZ
02/13/94 0556Z  160M    CW W8UVZ
02/12/94 0816Z  160M   SSB W9EVI
02/15/94 0640Z  160M   SSB W9KDX
02/12/94 0750Z  160M   SSB W9MAF
02/14/94 0553Z  160M   SSB W9ZR
02/12/94 0715Z  160M   SSB W9ZRX
02/12/94 2341Z  160M   SSB W9ZRX
02/04/94 0356Z  160M   SSB WA0OMA
02/12/94 0641Z  160M   SSB WA0PUJ
02/14/94 0553Z  160M   SSB WA0PUJ
02/13/94 0618Z  160M    CW WA0PUJ
02/11/94 0702Z  160M    CW WA1WMS
02/13/94 0450Z  160M    CW WA2UUC
02/12/94 0715Z  160M   SSB WA2UUK
02/11/94 0739Z  160M    CW WA2UUK
02/10/94 0703Z  160M   SSB WA3CUL
02/10/94 0636Z  160M   SSB WA3EJL
02/10/94 0703Z  160M   SSB WA3EUL
02/14/94 0553Z  160M   SSB WA3EUL
02/13/94 0450Z  160M    CW WA3EUL
02/12/94 0816Z  160M   SSB WA4CTA
02/14/94 0553Z  160M   SSB WA4JQS
02/12/94 0816Z  160M   SSB WA6HHQ
```

SECTION 6 OF 7

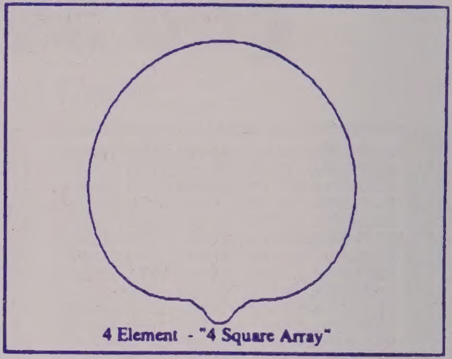
```
02/14/94 0553Z  160M   SSB WB2P
02/13/94 0425Z  160M    CW WB2P
02/12/94 0641Z  160M   SSB WB2U
02/12/94 0750Z  160M   SSB WB2ULI
02/10/94 0703Z  160M   SSB WB4DBD
02/12/94 0750Z  160M   SSB WB5VZL
02/15/94 0640Z  160M   SSB WB8YUC
02/12/94 0641Z  160M   SSB WB9GYU
02/15/94 0640Z  160M   SSB WB9YXY
02/15/94 0640Z  160M   SSB WD8LLD
02/11/94 0759Z  160M    CW WD8LLD
02/12/94 0750Z  160M   SSB WD9INF
02/12/94 0750Z  160M   SSB WF2Y
02/04/94 0508Z  160M    CW WI2E
02/11/94 0643Z  160M    CW WI2E
02/15/94 0640Z  160M   SSB WI9H
02/10/94 0636Z  160M   SSB WT3Q
02/13/94 0450Z  160M    CW WT3Q
02/13/94 0556Z  160M    CW WT3Q
02/10/94 0703Z  160M   SSB WW2Y
02/09/94 0700Z  160M   SSB WX4G
02/15/94 0640Z  160M   SSB YS1JRG
02/10/94 0636Z  160M   SSB YS1RRD
02/12/94 0830Z  160M   SSB YS1RRD
02/15/94 0640Z  160M   SSB YS1RRD
```

SECTION 7 OF 7

Two Elements vs. Four Elements With ACB-4

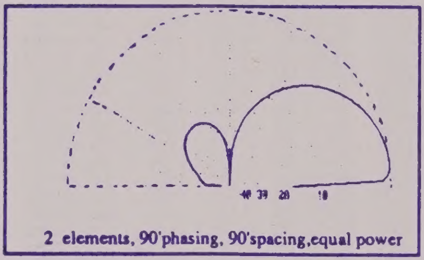


2 elements, 90'phasing, 90'spacing,equal power

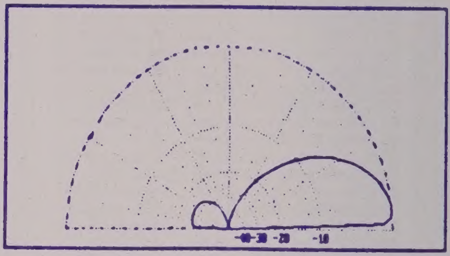


4 Element - "4 Square Array"

Plot of Azimuth



2 elements, 90'phasing, 90'spacing,equal power



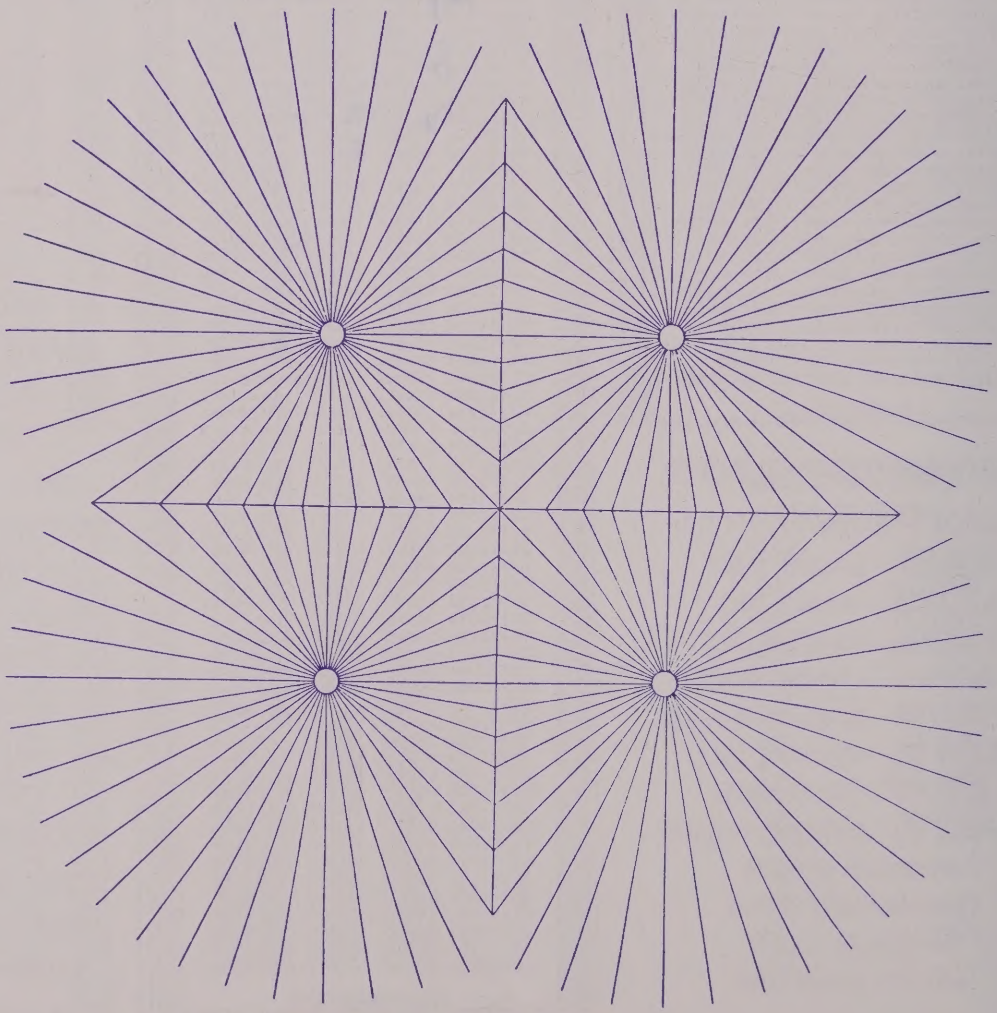
Plot of Elevation

Typical Radial System For 4 Square Array

• 4 EL	AREA
40M	- 100' x 100'
80M	- 200' x 200'
160M	- 400' x 400'

• 2 EL	AREA
40M	- 66' x 100'
80M	-180' x 120'
160M	-360' x 240'

NOTE: Trees are OK!



3Y0PI The Book

A Look At KK6EK's New Book - by K0CS

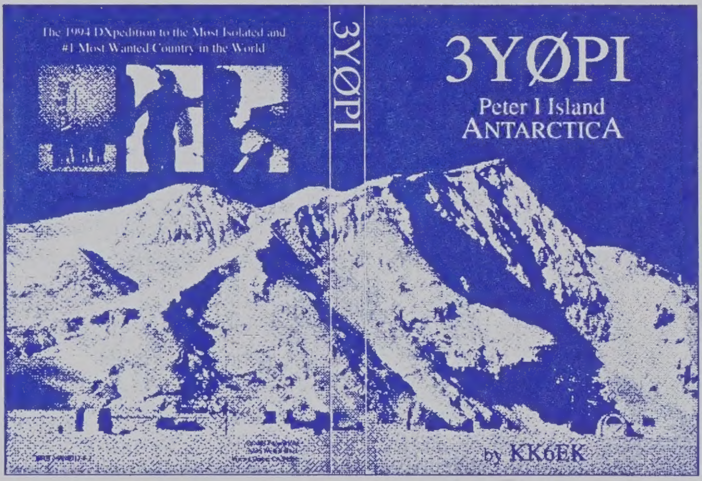
Editor's note - Robert W. Schmieder, KK6EK's, book, 3Y0PI Peter I Island Antarctica, was printed less than sixty days after the Peter I DXpedition came to a close. This 228 page book contains 95 photographs and dozens of charts and tables that would easily qualify it as scientific reference book. I was surprised to see the book available at this years Dayton Hamvention™. I am always impressed when a book about a DXpedition can be printed before the QSL cards!

Most of us lead pretty dull lives these days. If we aren't part of the "new poor" we are probably working at a pace that saps most of the creative energy that we used to enjoy when life was simpler.

One way to cope with a dull lifestyle is to choose reading material that takes us away from the mundane.

The
BooK!

This is a MUST READ. The book contains all the details about the preparation for the DXpedition, the expedition log, the radio log results, scientific results, comments and stories, operating tips, and the biographies of the 3Y0PI team. With a gorgious full-color cover, 240 pages, 64 photographs, and 78 illustrations.


The 1994 DXpedition to the Most Isolated and #1 Most Wanted Country in the World
3Y0PI
3Y0PI
Peter I Island
ANTARCTICA
by KK6EK

Profits go to help pay the 3Y0PI expenses.

Paperbound, 7"x10". $20 + shipping ($2 US, $15 elsewhere). Limited collector's edition hardbound, numbered and personally signed by all 9 team members, $75 + shipping.

Please order from:
Robert W. Schmieder, KK6EK
4295 Walnut Blvd.
Walnut Creek, CA 94596 USA
(Europe: G4DYO)

Many people chose fiction for their escape. Most of us have read more than one Tom Clancy adventure to escape from the reality of a boring life.

Amateur radio DXing is a hobby that provides many of us with an alternative form of escape. Working a rare country in an exotic location has also provided a boredom tonic for many DXers.

Personally, I think reading about an actual DXpedition to the rarest DXCC country in the world is also a pretty darn good escape. If you were fortunate enough to work this operation, one of the best in the history of amateur radio, your reading experience will be further enhanced.

3Y0PI, Peter I Island - Antarctica, by Robert W. Schmieder, KK6EK, takes the reader from the earliest stages of conception to the final evacuation from the island in vivid detail. This is one of the more honest accounts of a DXpedition that has ever been written. The author's "tell it like it is" attitude is refreshing.

Believe me, KK6EK is not on an ego trip when he reviews the operation. The reader gets to experience the entire DXpedition process from start to finish; that includes both the positive and darker sides of human nature. You get both sides of the story. The thrill of victory and the agony of the feet! Yes, something as simple as socks can cause a problem during an operation of this kind.

Peter I Isn't Bermuda - Even the experienced DXpeditioner will be impressed with the logistics of the Peter I operation. The travel details overcome by K0IR, the impressive packing list managed by WA4JQS, and the worldwide cooperation needed to put this one on the air will astound you. The Acknowledgements for this operation fill over eight pages and represent organizations and individuals from all corners of the planet. Most DX enthusiasts will be impressed by the large number of groups that made the operation so successful.

Things I Wanted To Know - KK6EK covers just about every detail of the operation with an assortment of charts, photos and drawings. A detailed description of the operating tents, their construction and actual layout is provided.

The DXpeditions operator scheduling and logging methods are also discussed at great length so you can understand why the 3Y0PI team operated as they did.

Excellent photos and profiles of the operators, K0IR, WA4JQS, ON6TT, KK6EK, W6MKB, XE1L, HB9AHL, N4GCK and Martin Tosseyn are provided so that you can better understand the groups chemistry.

The problems with a generator, blizzards damaging antennas, a small fire in the tent, damaged digital gear and methods of survival are all discussed at length. You feel like you are a part of the team.

The
MuG!

This is more than a coffee cup—it's a trophy and a map! While trying for those elusive Antarctica Q's, you can check to see if the station is near Peter I. And you can gaze at it to recall the glory of working 3Y0PI! It's 3-3/4" high, and holds 11 oz of whatever you want! It's polar-midnight black, with glacial-white markings. It's extremely strong and handsome. It is a great souvenir and a great conversation piece, *and* you can put coffee in it!

Profits go to help pay the 3Y0PI expenses.

$20 each delivered in US, $28 delivered worldwide.

Please order from:
Robert W. Schmieder, KK6EK
4295 Walnut Blvd.
Walnut Creek, CA 94596 USA
(Europe: G4DYO)

As a professional scientist, KK6EK, also presents you with a level of scientific information that would not normally be found in a book of this type. Weather conditions, atmospheric parameters, QSO rates and other statistics are presented with great detail.

He also introduces the various hosts from around the world that made the 3Y0PI team comfortable during their journey to the island. The "Pilot Station" concept is also fully described in detail and makes for very informative reading.

Things I Didn't Want To Know - I was amazed when I read that the 3Y0PI group was required to remove all of their human waste from the island when they evacuated. Generator problems are fine. Operator conflicts are OK. Blizzard stories are no problem. Disposal of human waste material? Keep this stuff out of my fantasy!

Conclusion - You will like this book a lot. I would suggest that you buy two copies. One for yourself and one for a special friend or relative that doesn't understand why you have an interest in DXing. When you present the second copy to your friend just say, "This is what it's all about." *3Y0PI Peter I Island Antarctica*, can be ordered directly from Robert W. Schmieder, KK6EK, 4295 Walnut Blvd., Walnut Creek, CA 94596. $20.00 + $2.00 Shipping U.S.A ($15.00 - DX) All profits go to 3Y0PI expenses.

Antenna RADIAL Management Made Easy.

Your HF Vertical Antenna needs Radials to work at it's best efficiency.

The GP-1 (GROUND PLANE ONE) is a cast Alumaloy buss that simplifies radial installation.

- Heavy Construction • Mast Mount Flange
- 24 Mounting Bolts • Feedline Opening
- 10 Inch Diameter • For Ground or Elevated Systems

Only
$35.95
U.P.S. Paid

MasterCard & VISA Accepted

Lance Johnson Engineering • P.O. Box 1047 • Elizabeth, CO 80107 • (303) 646-4630

First Season Final Listing

You Can Work All Continents On 160Meters From P40U

160 Meter Activity - We received a last minute 160 meter submission from George, W8UVZ, who operated from Aruba, P40U, in the CQ 160 Meter Contest.

George made 7, 160 meter contacts with Japan, during his successful return to the island. P40 is a very tough path to JA.

He reports that he was unable to work VK6HD on his 160 meter schedule, which would have provided VK6HD with his first South American contact on "top band".

Next Season - The next *Low Band Monitor* awards period will begin on September 1, 1994 and end on April 1, 1995. This is a slight change from our first season, which started a bit later.

The activity shown in this first program will be very useful when looking at overall propagation trends for this sustained period of low solar activity.

Will the 1994-1995 season offer us all some better low band opportunities? Stay tuned for further details.

160 METER WORKED ALL CONTINENTS 1993-94

NO.	CALL	DATE	AFRICA	ASIA	EUROPE	N. AMER.	OCEANIA	S. AMER.
1	KY0A	11-17-93	6W6JX	JA1CGM	JW5NM	VE3BW	VK6ACY	P40W
2	W8UVZ	11-20-93	ZD8Z	JA1CGM	UB5ZAL	KL7Y	VK4YB	PY0FF
3	K3ND	11-27-93	EA9EO	4X/S59PR	ZB2X	VP5RX	KH6CC	P40W
4	AA6TT	11-27-93	EA8BR	JH1RES	TM7C	VP5L	3D2OH	9Y4H
5	W8AH	11-30-93	EA9EO	4X4NJ	YO3APJ	FM5BH	KH6XT	9Y4H
6	W0CD	11-30-93	ZD8Z	JF1NZW	G3SZA	FJ/F6HWU	3D2AW	P40W
7	K0CS	12-03-93	6W6JX	4X4NJ	PA0HIP	V31DX	KH6CC	9Y4H
8	GW3YDX	11-27-93	VQ9QM	RA9FBT	GU2FRO	WA3EUL	ZL2JR	P40W
9	AB0X	12-23-93	ZD8Z	JA1CGM	DK6WL	K5NW	KH6AT	9Y4H
10	W8JGU	12-15-93	ZD8VJ	JA3ONB	4K2MAL	WA4DRU/VP5	VK6ACY	9Y4H
11	K9FD	12-26-93	9G1XA	JA3ONB	UB5ZAL	HH2PK	VK5BC	WS4E/YV5
12	N5WA	12-27-93	EA8PP	JA6HUG	G3PQA	V47KP	KH6CC	9Y4H
13	WB9GYU	01-06-94	ZS6EZ	JA1CGM	JW5NM	HR2IQC	VK6HD	9Y4H
14	W0ZV	11-27-93	5N0MVE	4X4NJ	Z30M	TI1C	KH6CC	9Y4H
15	K4ODL	11-18-93	ZD8Z	JA1HQT	GI0KOW	KL7Y	VK6ACY	P40W
16	NI6T	12-20-93	ZD8Z	JA7OEM	G3RBP	VY1JA	3D2OH	P40W
17	N4KG	01-13-94	EA8PP	JA1CGM	S59UN	K9BG/VP5	FK8CP	4K1F
18	NX0I	12-25-93	ZD8Z	JA7BXS	IV3PRK	YS1X	V7X	HC0E
19	K4IBP	01-30-94	6W6JX	JA1HQT	ON6ACG	KF7S/KL7	KH6U	9Y4H
20	WB9Z	11-27-93	ZD8Z	S59PR/4X	UC2WAF	TI1C	KH6AT	P40W
21	K4KUZ	02-11-94	C52ZP	4X4NJ	OT4T	VP9AD	KH6CC	P40O
22	K4SB	11-27-93	EA9EO	4X4NJ	SM5EDX	FJ/F8UFT	VK3AJJ	PY1BVY
23	KX4R	11-28-93	EA9EO	4X4NJ	LY7A	V47KP	KH6AT	PJ2/WJ2O
24	N4JJ	11-28-93	EA8EA	JA7OEM	G3LNS	NL7G	VK6HD	8R1K
25	K8YSE	03-15-94	A22MN	JA3ONB	CT1AOZ	AL7MX	ZL2JR	9Y4H
26	NT4O	03-18-94	ZS6EZ	A71CW	4K2MAL	TI9CF	KH6CC	4K1F
27	P40U	02-01-94	6W6JX	JA1JRK	G3PQA	AA6TT	FK8CP	YV1NX

80 METER WORKED 100 COUNTRIES 1993-94

NO.	CALL	DATE	COUNTRY	STATE	SUBMITTED	LATEST
1	W8AH	11-26-93	USA	WEST VIRGINIA	108	108 FINAL
2	K9FD	12-30-93	USA	ILLINOIS	106	106 FINAL
3	NI6T	12-20-93	USA	CALIFORNIA	119	145 FINAL
4	N2KK	12-05-93	USA	CALIFORNIA	106	106 FINAL
5	AB6ZV	02-03-94	USA	CALIFORNIA	107	148 FINAL
6	K6SSS	02-09-94	USA	CALIFORNIA	126	132 FINAL
7	N4KG	03-01-94	USA	ALABAMA	120	133 FINAL
8	W8UVZ	11-28-93	USA	MICHIGAN	105	105 FINAL
9	VK4MZ	04-04-94	AUSTRALIA	QUEENSLAND	104	104 FINAL
10	K8YSE	04-01-94	USA	OHIO	102	102 FINAL
11	K3ND	04-13-94	USA	PENNSYLVANIA	103	103 FINAL
12	NT4O	04-14-94	USA	NORTH CAROLINA	145	145 FINAL
13	VK3EW	04-15-94	AUSTRALIA	VICTORIA	108	108 FINAL

40 METER WORKED 150 COUNTRIES 1993-94

NO.	CALL	DATE	COUNTRY	STATE	SUBMITTED	LATEST
1	W8AH	11-26-93	USA	WEST VIRGINIA	157	157 FINAL
2	VK4MZ	01-13-94	AUSTRALIA	QUEENSLAND	166	191 FINAL
3	N4KG	11-30-93	USA	ALABAMA	172	193 FINAL
4	K9FD	02-18-94	USA	ILLINOIS	151	151 FINAL
5	VK3EW	04-15-94	AUSTRALIA	VICTORIA	162	162 FINAL

LOW BAND MONITOR POWER SPOTS - MAY 1994

TNX: N8HTT - W8TN - N2KK - K3ND - AB6ZV - VE7BS

160 METERS

1840.5	EA3NI	19-May-1994	0402Z
1833.0	VK9NS	18-May-1994	1019Z
1831.1	ZL2JR	17-May-1994	0916Z
1835.0	SV8ZS	16-May-1994	0311Z
1833.2	G3RBP	12-May-1994	0135Z
1840.5	EA3NI	11-May-1994	0410Z
1830.9	SV8ZS	11-May-1994	0317Z
1828.6	DJ7RD	11-May-1994	0303Z
1833.2	GD4BEG	10-May-1994	0335Z
1834.8	RW1ZM/MM	10-May-1994	0332Z
1830.5	DL3XK	10-May-1994	0329Z
1840.5	SV3KH	10-May-1994	0327Z
1834.9	SV8ZS	10-May-1994	0318Z
1831.2	DK7SU	10-May-1994	0300Z
1834.5	SV8ZS	9-May-1994	0313Z
1826.0	**UA0IAK**	**7-May-1994**	**1220Z**
1841.0	VK3DQW	7-May-1994	1031Z
1833.6	SV8ZS	7-May-1994	0315Z
1830.5	DK7SU	7-May-1994	0311Z
1827.0	VP2V/DK7PE	7-May-1994	0301Z
1832.2	4X4NJ	7-May-1994	0254Z
1831.5	TU2MA	7-May-1994	0110Z
1831.0	UR5IUQ	6-May-1994	0204Z
1835.3	SV8ZS	5-May-1994	0318Z
1850.0	CT1UP	4-May-1994	0524Z
1832.0	5W1GC	3-May-1994	1308Z
1831.0	LZ2WA	3-May-1994	0134Z

80 METERS

3799.0	VK3DZM	19-May-1994	1022Z
3798.9	ZL4AP	19-May-1994	1012Z
3795.0	VE2PR	19-May-1994	0404Z
3800.0	HK4DHR	19-May-1994	0333Z
3796.9	VE2PR	19-May-1994	0152Z
3798.0	VK6LK	18-May-1994	2304Z
3795.0	V63JC	18-May-1994	1207Z
3797.0	VK9NS	18-May-1994	1020Z
3795.0	HK4DHR	18-May-1994	0939Z
3791.5	PP5OK	18-May-1994	0201Z
3798.0	SP1PEA	18-May-1994	0044Z
3505.0	VK9NS	17-May-1994	1121Z
3795.0	HK4DHR	17-May-1994	0934Z
3799.0	CX6CR	17-May-1994	0923Z
3794.0	KD5M/HR3	17-May-1994	0501Z
3789.5	PU1ALH	17-May-1994	0459Z
3799.1	PZ1EL	17-May-1994	0454Z
3789.5	PU1ALH	17-May-1994	0352Z
3798.0	EG9ITU	17-May-1994	0300Z
3511.0	T91EVC	17-May-1994	0304Z
3507.1	J6/AH0G	17-May-1994	0220Z
3785.0	KP4DKE	17-May-1994	0121Z
3799.9	4L4KK	17-May-1994	0109Z
3507.2	J6/AH0G	17-May-1994	0037Z
3799.6	CT1ESO	16-May-1994	0410Z
3798.0	CX4CR	14-May-1994	1019Z
3506.5	HK5QGX	14-May-1994	0921Z
3796.9	UA0FDX	13-May-1994	1312Z
3509.0	C21/ZL1AMO	13-May-1994	1123Z
3795.0	AH8A	13-May-1994	1035Z
3795.0	HK4DHR	13-May-1994	0946Z
3798.0	LW1EXU	13-May-1994	0927Z
3790.4	F5LQ	13-May-1994	0427Z
3794.0	G3DAM	13-May-1994	0422Z
3799.5	OZ8BV	12-May-1994	2357Z
3798.0	**XX9GD**	**12-May-1994**	**1312Z**
3785.7	S57JES	12-May-1994	0319Z
3790.0	CT1ESO	12-May-1994	0306Z
3792.3	OK1AWQ	12-May-1994	0310Z
3790.0	HH2PK	12-May-1994	0254Z
3797.0	4L4KK	12-May-1994	0140Z
3794.3	DL2LQN	12-May-1994	0108Z
3795.0	HL9HH	11-May-1994	1034Z
3792.1	HI8/N2CQR	11-May-1994	0958Z
3799.0	CX6CG	11-May-1994	0939Z
3795.0	HK4DHR	11-May-1994	0930Z
3799.5	LU8EEM	11-May-1994	0904Z
3799.0	YV5DEH	11-May-1994	0526Z

80 METERS

3799.0	EA1DLU	11-May-1994	0526Z
3799.0	CT1ESO	11-May-1994	0526Z
3799.0	9G1MR	11-May-1994	0525Z
3794.0	3X0DEX	11-May-1994	0417Z
3502.0	PJ7/AH0G	11-May-1994	0354Z
3791.0	T97T	11-May-1994	0258Z
3788.1	DL3OA	11-May-1994	0259Z
3512.0	SV2AVP	11-May-1994	0257Z
3799.6	SP1PEA	11-May-1994	0250Z
3506.5	F5IN	11-May-1994	0241Z
3504.4	PJ7/AH0G	11-May-1994	0243Z
3510.0	OA4CWR	11-May-1994	0231Z
3505.2	T91EVC	11-May-1994	0231Z
3504.5	PJ7/AH0G	11-May-1994	0152Z
3799.5	SP1PEA	10-May-1994	2335Z
3794.0	F9FC/FO	10-May-1994	1317Z
3794.0	KB6VAT/DU1	10-May-1994	1243Z
3794.1	BV2FI	10-May-1994	1220Z
3798.2	JA1JRK	10-May-1994	0957Z
3798.2	LU3FA	10-May-1994	1000Z
3792.0	ZL2JR	10-May-1994	0954Z
3798.9	LU8EEM	10-May-1994	0904Z
3800.0	CP8HD	10-May-1994	0447Z
3792.0	DL3OI	10-May-1994	0325Z
3798.2	KP4DKE	10-May-1994	0326Z
3800.0	CP8HD	10-May-1994	0313Z
3788.0	5K3L	10-May-1994	0258Z
3795.6	LU2DQ	10-May-1994	0249Z
3793.1	LU1FA	10-May-1994	0241Z
3798.2	KP4DKE	10-May-1994	0228Z
3791.5	J79W	10-May-1994	0223Z
3789.0	LU6FFL	10-May-1994	0218Z
3505.1	LU2BRG	10-May-1994	0206Z
3507.0	CX3AL	10-May-1994	0143Z
3505.5	T91EVC	10-May-1994	0133Z
3650.0	EW3LB	10-May-1994	0131Z
3792.5	EA2FD	10-May-1994	0036Z
3792.5	G0GXT	10-May-1994	0014Z
3792.5	UA9USU	9-May-1994	2352Z
3795.5	FK8FZ	9-May-1994	1043Z
3508.0	C21/ZL1AMO	9-May-1994	1050Z
3795.4	KH8BB	9-May-1994	1039Z
3513.9	OK2PLH	9-May-1994	0339Z
3800.0	IK4GRO	9-May-1994	0302Z
3799.7	T97T	9-May-1994	0224Z
3794.0	OK1AWQ	9-May-1994	0219Z
3789.0	FG5FC	8-May-1994	2328Z
3795.9	V73C	8-May-1994	1332Z
3795.0	XX9GD	8-May-1994	1110Z
3798.0	VK3DZM	8-May-1994	1031Z
3785.0	A35RK	8-May-1994	0746Z
3508.3	HK6KKK	8-May-1994	0338Z
3794.3	IT9PKO	8-May-1994	0413Z
3784.6	4N70BB	8-May-1994	0314Z
3524.0	YS1DRF	8-May-1994	0303Z
3792.3	I8RIZ	8-May-1994	0154Z
3785.1	IN3QBR	8-May-1994	0133Z
3789.8	IO3EVK	8-May-1994	0128Z
3799.9	DL3OI	8-May-1994	0121Z
3794.7	J79W	8-May-1994	0115Z
3794.9	FM5DN	8-May-1994	0032Z
3509.8	ZS6QU	7-May-1994	2348Z
3528.5	IK2GZU	7-May-1994	2346Z
3796.0	FK8FZ	7-May-1994	1348Z
3792.1	V73OR	7-May-1994	1320Z
3800.0	VK2ANS	7-May-1994	1123Z
3791.0	ZL2SN	7-May-1994	1036Z
3797.0	VK3TZ	7-May-1994	1034Z
3505.0	HR1LW	7-May-1994	1031Z
3798.0	VK3DZM	7-May-1994	1008Z
3800.0	PP5OK	7-May-1994	0327Z
3510.8	LZ2PP	7-May-1994	0318Z
3506.9	PZ1DV	7-May-1994	0307Z
3506.6	PZ1EV	7-May-1994	0307Z
3501.1	VP2V/DK7PE	7-May-1994	0257Z
3505.4	PT2NP	7-May-1994	0257Z
3799.9	J79W	7-May-1994	0251Z
3794.5	TG9AJR	7-May-1994	0245Z

40 METERS

7009.8	YC9XR	19-May-1994	1004Z
7005.3	J8/AH0G	19-May-1994	0940Z
7009.9	FO5OU	19-May-1994	0430Z
7005.5	HK3/KD5M	19-May-1994	0352Z
7005.1	8P9GU	19-May-1994	0235Z
7005.5	ZA1J	19-May-1994	0210Z
7004.2	UA2FL	18-May-1994	2257Z
7009.0	Z32XA	18-May-1994	2243Z
7006.1	TR8XX	18-May-1994	0448Z
7007.1	9J2BO	18-May-1994	0434Z
7005.0	TI4CF	18-May-1994	0326Z
7004.3	VP8GAV	18-May-1994	0125Z
7009.5	ES1WN	18-May-1994	0127Z
7006.8	PY0TUP	18-May-1994	0058Z
7010.9	EG1ITU	17-May-1994	2338Z
7015.8	ED1SLG	17-May-1994	2313Z
7007.4	H44/JA1OEM	17-May-1994	1311Z
7012.0	V73C	17-May-1994	1109Z
7005.0	VK9NS	17-May-1994	1042Z
7004.9	ZL9A	17-May-1994	0917Z
7013.3	LZ2EV	17-May-1994	0317Z
7008.5	UX0ZD	17-May-1994	0227Z
7005.0	EU6EU	17-May-1994	0158Z
7010.3	PY0TUP	17-May-1994	0150Z
7015.1	LY3ID	17-May-1994	0150Z
7022.6	CP94USA	17-May-1994	0137Z
7007.9	8P9GU	17-May-1994	0117Z
7047.0	EG8ITU	17-May-1994	0052Z
7006.9	PY0TUP	17-May-1994	0024Z
7001.8	6W1/F5PHW	17-May-1994	0007Z
7005.2	J6/AH0G	17-May-1994	0002Z
7008.4	RZ6AC	16-May-1994	2346Z
7008.6	4F2IR	16-May-1994	1313Z
7004.5	OA4AWE	16-May-1994	1033Z
7002.6	FO5OU	16-May-1994	0813Z
7004.5	Z32XA	16-May-1994	0347Z
7013.5	UR7GR	16-May-1994	0214Z
7003.5	A22DX	16-May-1994	0018Z
7004.7	9M6BZ	15-May-1994	1337Z
7009.1	FM/DK7PE	15-May-1994	1028Z
7008.0	BV4ME	13-May-1994	1349Z
7009.1	FO5OU	13-May-1994	0940Z
7002.3	PZ1DY	13-May-1994	0725Z
7084.0	AH8A	13-May-1994	0701Z
7006.6	PY0TUP	12-May-1994	2303Z
7010.3	5WIGC	12-May-1994	1423Z
7013.0	4F2IR	12-May-1994	1303Z
7005.5	G4BUE	12-May-1994	0516Z
7003.0	9J2BO	12-May-1994	0423Z
7001.0	Z31GX	12-May-1994	0420Z
7004.4	SV1LV	12-May-1994	0322Z
7005.2	SV1AKX	12-May-1994	0015Z
7004.9	X5EBL	11-May-1994	2306Z
7009.9	BV4ME	11-May-1994	1330Z
7005.1	BZ5HAN	11-May-1994	1259Z
7009.3	8J3KOB/3	11-May-1994	1125Z
7005.7	RA0FN	11-May-1994	0943Z
7004.5	OA4CWE	11-May-1994	0929Z
7210.0	C21/ZL1AMO	11-May-1994	0705Z
7003.0	5W1GC	11-May-1994	0536Z
7005.5	PZ1DV	11-May-1994	0345Z
7011.3	S59AA	11-May-1994	0344Z
7005.0	5R8DG	11-May-1994	0333Z
7001.5	OA4FW	11-May-1994	0320Z
7009.1	IS0/YO3RA	10-May-1994	2341Z
7004.5	C21/ZL1AMO	10-May-1994	1114Z
7023.1	A35RK	10-May-1994	0643Z
7002.0	Z31CZ	10-May-1994	0421Z
7004.1	3B8CF	10-May-1994	0234Z
7005.2	PY0TUP	10-May-1994	0156Z
7012.4	FS5PL	10-May-1994	0130Z
7008.5	PY0TUP	10-May-1994	0114Z
7006.5	X5FRS	10-May-1994	0011Z
7002.5	VP8CPY	10-May-1994	0002Z
7004.5	PY0TUP	9-May-1994	2237Z
7004.5	FR5DN	9-May-1994	1328Z
7205.0	HS0/G4UAV	9-May-1994	1317Z
7004.5	ZL2AGY	9-May-1994	1114Z